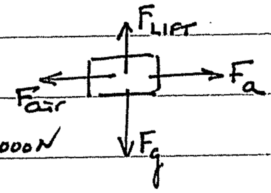
#1 a)



b) $\vec{F}_{NET} = m\vec{a}$

$F_a - F_{air} = ma$

$62000 - 12000 = 28000\,a$

$a = 1.79\ m/s^2$

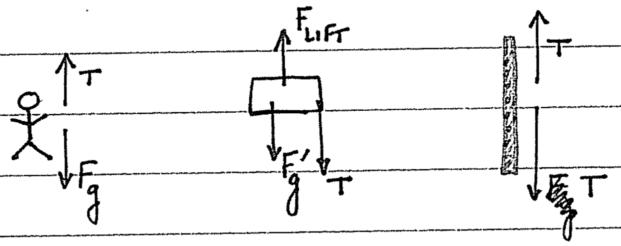
c) $\because F_{NET} = 0$

$\therefore F_{LIFT} = F_g = mg$

$= 28000(9.8)$

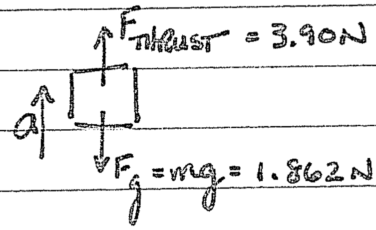
$= 274400\ N$

#2



ACTION	RXN
F_g Earth on Boy	F_g Boy on Earth
T Rope on Boy	T Boy on Rope
F_{air} on Heli. (lift)	F_{Heli} on Air
F_g' Earth on Heli	F_g' Heli on Earth
F_{Heli} on Rope	F_{Rope} on Heli

#3

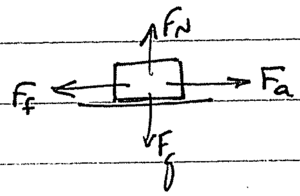


$\vec{F}_{NET} = m\vec{a}$

$3.90 - 1.862 = 0.19\,a$

$a = 10.7\ m/s^2$

#4 Constant vel.



$\because F_{NET} = 0\ N$ Horiz.

$\therefore F_a = F_f = \mu F_N$

$= 0.80\,F_N$

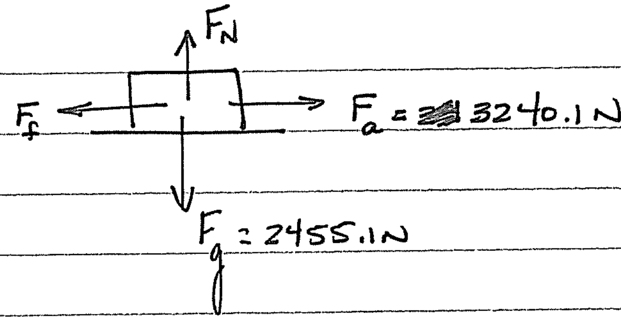
$\mu = 0.80$

$\because F_N = F_g$

$\therefore F_a = 0.8\,F_g$

$= 0.8\,mg = 616.2\ N$

#5



$\mu = 0.72.$

$\vec{F}_{NET} = m\vec{a}$

$F_a - F_f = m\vec{a}$

$3240.1 - \mu F_N = m\vec{a}$

$\because F_N = mg = F_g$

$3240.1 - (0.72)(2455.1) = ma$

$1472.43 = ma$

$\because F_g = mg \quad \therefore m = F_g/g = 2455.1/9.8$

$= 250.5\,kg$

$\therefore 1472.43 = 250.5a$

$a = 5.88\,m/s^2$

#6

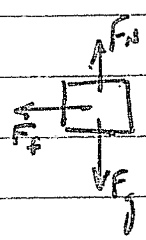
$m = 1186.1\,kg$

$V_1 = 34.6\,m/s$

$V_2 = 0\,m/s$

$\Delta t = 3.41\,s$

$\mu = ?$



$\vec{F}_{NET} = m\vec{a}$

$F_f = ma$

$\vec{V}_2 = \vec{V}_1 + \vec{a}\Delta t$

$-34.6 = 3.41a$

$a = -10.15\,m/s^2$

$\therefore F_f = ma$

$= 1186.1(-10.15)$

$= -12038.9\,N$

Implies opposite direction to motion.

$\because F_f = \mu F_N$

$\therefore 12038.9 = \mu F_N$

$\because F_N = F_g.$

$12038.9 = \mu mg$

$12038.9 = \mu(1186.1)(9.8)$

$\mu = \frac{12038.9}{11623.78}$

$= 1.03$

#7 $V_1 = 0 m/s$

$V_2 = 0.30 m/s$

$\Delta t = 0.75 s$

$\vec{a} = ?$

$V_2 = V_1 + a\Delta t$

$0.3 = 0 + 0.75 a$

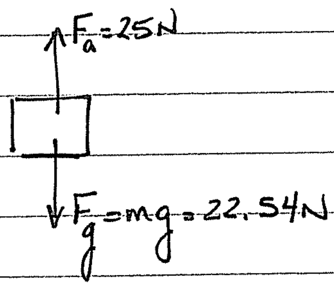
$a = 0.40 m/s^2$

$\vec{F}_{NET} = m\vec{a}$

$= (27+52)(0.4)$

$= 31.6 N$

#8



(b) $\vec{F}_{NET} = F_a - F_f$

$= 2.46 N$ [UP]

(c) $\vec{F}_{NET} = m\vec{a}$

$2.46 = 2.3\vec{a}$

$\vec{a} = 1.07 m/s^2$

(d) $V_1 = 0 m/s$

$\Delta d = ?$

$a = 1.07 m/s^2$

$\Delta t = 1.0 s$

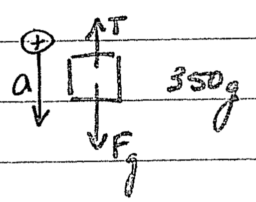
$\Delta d = v_1\Delta t + \frac{1}{2}a\Delta t^2$

$= 0 + \frac{1}{2}(1.07)(1)^2$

$= 0.85 m$

#9 a) COUNTER CLOCKWISE

b)



$F_{NET} = ma$

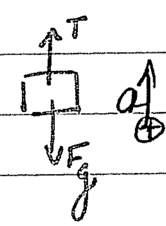
$F_g - T = ma$

$(0.35)(9.8) - T = 0.35a$

$3.43 - T = 0.35a$

$T = 3.43 - 0.35a$

c)



$F_{NET} = ma$

$T - F_g = ma$

$T - (0.25)(9.8) = 0.25a$

$T = 0.25a + 2.45$

d) $3.43 - 0.35a = 0.25a + 2.4$

$0.6a = 0.98$

$a = 1.63 m/s^2$

e) $V_1 = 0 m/s$

$a = 1.63 m/s^2$

$\Delta t = ?$

$\Delta d = 0.50 m$

$\Delta d = v_1\Delta t + \frac{1}{2}a\Delta t^2$

$0.50 = 0.815\Delta t^2$

$\Delta t = 0.78 s$

#10 a) $F_g = \frac{Gm_1m_2}{R^2} = \frac{(6.67\times10^{-11})(2.4\times10^{15})(2)}{(6400)^2} = 7.82\times10^{-3}\ N$

b) $F_g = mg = \frac{Gm_1m_2}{R^2}$

c) $a = 3.91\times10^{-3}\ m/s^2$

$g = \frac{Gm_2}{R^2} = \frac{(6.67\times10^{-11})(2.4\times10^{15})}{(6400)^2} = 3.91\times10^{-3}\ N/kg$

d) $R = 6400 + 100\,000$

$= 106400\ m.$

$\therefore g = \frac{Gm_2}{R^2} = \frac{6.67\times10^{-11}(2.4\times10^{15})}{(106400)^2}$

$= 1.41\times10^{-5}\ N/kg$

$\therefore a = 1.41\times10^{-5}\ m/s^2$

~~e)~~

#11 Take a 10kg sample of gold.

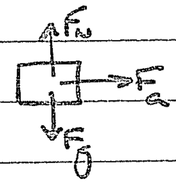
@ Equator, $\vec{g}$ is less than at Pole.

$F_g = mg =$ weight

$\therefore$ Weight at Equator is less than at Pole & thus sample would be cheaper.

If sold by mass, the amount of matter is the same and thus it would not matter where it was purchased.

#12



(a) $\vec{F}_{NET} = m\vec{a}$

$F_a = ma$

$= (1)(5)$

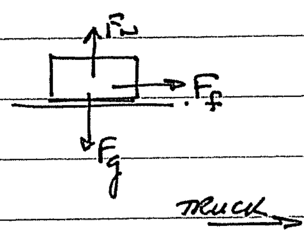
$= 5N$

(b) $F_{NET} = ma$

$5 = m(2)$

$m = 2.5 \text{ kg}$

#13

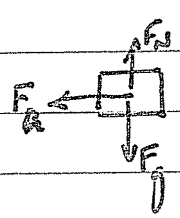


CRATE WANTS TO REMAIN WHERE IT IS (INERTIA). FRICTION CAUSES CRATE TO MOVE WITH TRUCK AS IT ACCEL.

#14 The pin exerts a force on the ball equal in magnitude but opposite in direction — Newton's 3rd Law

#15 $V_i = 20 m/s$

$a = 5.0 m/s^2$



$F_{NET} = ma$

$= ma$

$= -5.0 m.$

OMIT #15

AS NOT ENOUGH INFO GIVEN.